RECEIVED
CENTRAL FAX CENTER
JAN 2 6 2007

REMARKS

In previous communications, the Examiner rejected claims 1-13 and 16-28. In this response, Applicants have amended claims 1-4, 6, 7, 10, 13, 16, 18, 20, 22, 24, 25 and 27, cancelled claims 5, 21 and 28, and provided a supplemental Information Disclosure Statement. Upon entry of the amendments, claims 1-4, 6-13, 16-20 and 22-27 will be pending in the application.

In addition, Applicants have summarized an interview, which was conducted with the undersigned, Dr. Netemeyer, Mr. Banki, Examiner Proctor and Examiner Rodriguez on January 10, 2007. In the interview, Applicants discussed the prior art rejections, deficiencies of the prior art, enablement of claims 1 and 13, and the claimed subject matter, which are discussed further below. Applicants appreciate the Examiner's consultation. Accordingly, reconsideration of the rejections and allowance of the pending claims is respectfully requested.

Information Disclosure Statement

In the Office Action, the Examiner referenced certain prior art that was included in the Notice of References Cited. In an abundance of caution, Applicants have included a supplemental Information Disclosure Statement (IDS) with this response citing additional references. The Commissioner is authorized to charge the appropriate fees for the supplemental IDS to the Deposit Account No. 05-1328. If this amount is in error or additional fees are required, the Commissioner is authorized to charge the appropriate fees to the deposit account noted above. Accordingly, Applicants respectfully request the Examiner consider the references cited in the supplemental Information Disclosure Statement.

Claim Objections

In the Office Action, the Examiner objected to certain claims 5 and 18. In the present response claim 5 has been cancelled. Accordingly, the objection to claim 5 is believed to be moot. With regard to claim 18, Applicants apologize for the clerical error relating to the marked-up version of this claim, which was discussed in the previous communication to the

Examiner. Accordingly, as suggested by the Examiner, Applicants have maintained the amended version of this claim in this response. Therefore, as the objection to claim 5 is now moot, Applicants respectfully request the Examiner withdraw the objection to claim 18.

Amendments to the Claims and Claim Interpretation

In the Office Action, the Examiner provided a claim interpretation section discussing various recitations in the claims. While Applicants do not necessarily agree with certain interpretations by the Examiner, Applicants have amended the claims in the present response to clarify specific aspects, as discussed with the Examiner in the consultation.

Specifically, Applicants have amended independent claims 1, 10, 13, 16 and 24 to clarify a definitions file utilized with the first and second set of generic classes and to clarify other terms, such as generic facility types, model facility types, generic named attribute types, model named attribute types, named attribute instances and facility instances. In particular, Applicants have included the phrase "create facility instances from model facility types and named attribute instances from model named attribute types, wherein facility instances and named attribute instances are stored in memory and coupled in a facility network to simulate transport phenomenon," as recited in claim 1, "named attribute instances associated with the one of the facility instances model properties of the one of the facilities used in the production of hydrocarbons from a reservoir" and "wherein the facility instances and named attribute instances are organized to represent facilities used in the production of hydrocarbons from a reservoir," as recited in claim 10, and "wherein the hydrocarbon facility network represents facilities in the hydrocarbon system," as recited in claim 16. These amendments along with the changes to specific phrases are believed to clarify the claims. Further, claim 1 has also been amended to include the phrases "a processor" and "memory coupled to the processor." The amendments to the claims are provided above in the marked-up version of the claims and are believed to be supported at least on pages 6-10, 12-17 and 21-22; Appendix 2; Appendix 6; and in Figs. 2 and 3. As these amendments are not believed to introduce any new matter, Applicants respectfully request entry of the amendments.

Further, Applicants have also amended claims 2, 3, 4, 6, 7, 18, 20, 22, 25 and 27. In particular, claims 2, 4, 7, 18, 20, 22, 25 and 27 have been amended to clarify certain terms in accordance with terms used in the claims that each claim depends from. Further, claim 3 has been amended to clarify the transport and facility instances, while claim 6 has been amended to clarify the use of the graphical user interface to define the facility network. Similar to the discussion above, these amendments are supported at least in the passages noted above. Again, as these amendments are not believed to introduce any new matter, Applicants respectfully request entry of the amendments.

Rejections under 35 U.S.C. § 101

In the Office Action, the Examiner rejected claims 1-9 under 35 U.S.C. § 101, as being directed to non-statutory subject matter. In particular, the Examiner stated that the claims 1-9 are directed to a computer system that does not have limitations of a tangible computer apparatus. In the present response, Applicants have included recitations of "a processor" and "memory coupled to the processor" in amended claim 1. These amendments are believed to be supported in at least the passages discussed above, which are not believed to add any new matter. Accordingly, Applicants respectfully request entry of the amendments.

First Rejection under 35 U.S.C. § 112

The Examiner rejected claims 1-9 and 13 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. In particular, the Examiner asserted that the limitation of "the extensible class hierarchy permitting the addition of additional object types and additional member variables without any modifications to the class hierarchy itself," as recited in claim 1, prevents a person of ordinary skill in the art from making and using the invention. Applicants respectfully disagree.

To begin, various passages and figures of the present application describe this aspect of the claims recitation. For example, Fig. 2 illustrates one embodiment of a class hierarchy, which may be implemented in C++ code. *See* Application, Fig. 2; pages 12-17. The class hierarchy corresponds to an unchanging collection of C++ classes, which are depicted by

boxes 200-205 and 207-213 of Fig. 2 and are described in specific detail in passages on pages 12-13 and passages on pages 15-17 of the specification. In particular, in the passages on pages 12-13, the sub-hierarchy of boxes 200-205 and their interrelationships are described as a first set of generic classes (e.g., generic facility type classes), while boxes 207-213 and their interrelationships are described as the second set of generic classes (e.g., generic named attribute classes). These C++ classes in the class hierarchy are generic because each class in the first sub-hierarchy and second sub-hierarchy contains a minimal amount of information, which is sufficient to define the generic behavior of the objects created from these classes.

A data definitions file (DDF) is utilized with these generic classes to define specialized behavior of desired facility types and named attributes types to be used in a model. *See id.* at Figs. 2-3, pages 12-17, Appendix 2 and Appendix 6. As a specific example, the DDF contains text descriptions for possible facility type, such as "WellNode," "NetworkNode," SeparatorNode," "Well," and "NetworkConnection." *See id.* pages 13-14 Also, the DDF contains text descriptions for each of the specialized named attributes. *See id.* As a result, specialized or model facility types (e.g., the type of facilities that are created in the reservoir simulation model) and the specialized attribute values for each specialized facility type are defined in a Data Definitions File (DDF). The computer system processes the DDF to create definitions that are objects of the FacilityTypeSystemAttributes class 303, one object 303 for each model facility type and definitions that are objects of the AttributeDefinitions class 304, one object 304 for each model named attribute type. *See id.* at pages 16-17. The objects 303 and 304 are used to create an instance of a facility and its accompany attribute value instances. *See id.* By changing the contents of the DDF, and reprocessing it, the computer system is re-configured with a different set of definitions (objects 303 and 304), and therefore provides the user with a different set of specialized facility types. *See id.* at pages 13-14 and 16-17.

Accordingly, the use of these generic classes provides a mechanism for representing more specialized facility types and many different named attributes. *See id.* at pages 12-17. As an example, the Node facility class (box 203 of Fig. 2) is generic because Node objects can be instantiated to represent a variety of different node facility types, even through the class hierarchy does not have a distinct specialized node class for each node facility type. *See*

id. Thus, additional more specialized "facility types" are provided, but do not correspond to classes in the first sub-hierarchy. *See id.* Similarly, for the SystemAttributeValue (212 of Fig.2) is a generic attribute class because SystemAttributeValue objects can be instantiated to represent a variety of model named attributes types. *See id.* Accordingly, through the use of the data definitions file, additional model facility types and additional named attributes types may permitted without any modifications to the class hierarchy itself.

Based on this discussion, the consultation with the Examiners, and the clarifications in the claims, Applicants submit that the present application complies with the current, well-established legal principals related to enablement. Accordingly, Applicants respectfully submit that the specification of the present application clearly supports the claimed subject matter in terms that are believed to enable a person skilled in the art to which it pertains to make and/or use the same. Therefore, Applicants respectfully request withdrawal of the rejection.

Second Rejection under 35 U.S.C. § 112

The Examiner rejected claim 21 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In the present response, claim 21 has been cancelled. Thus, Applicants respectfully submit that this rejection is now moot.

Rejection of Claims 1-9 under 35 U.S.C. §§ 102 and 103

The Examiner rejected claims 1-9 under various combinations of prior art. For instance, the Examiner rejected claims 1-5, 8 and 9 under U.S.C. § 102 (b) as being anticipated by passages from "The C++ Programming Language, Third Edition" by Bjarne Stroustrup (1997), which is herein referred to as "Stroustrup." The Examiner rejected claims 6 and 7 under 35 U.S.C. § 103 (a) as being unpatentable over Stroustrup and U.S. Patent No. 6,842,725 to Sarda, which is herein referred to as "Sarda." The Examiner rejected claim 7 under 35 U.S.C. § 103 (a) as being unpatentable over Stroustrup and "Design Patterns: Elements of Reusable Object-Oriented Software" by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides (1995), which is herein referred to as "Vlissides." Again,

Applicants respectfully submit that the references, alone or in combination, do not disclose the claimed subject matter.

Applicants respectfully submit that the Stroustrup reference fails to disclose the recited features of amended claim 1. For example, Stroustrup fails to disclose a computer system having a software product configured to "provide a file that defines model facility types based on the first set of generic classes and that defines model named attribute types based on the second set of generic classes, wherein the file permits the addition of additional model facility types and additional model named attribute types without any modifications to the class hierarchy," and "create facility instances from model facility types and named attribute instances from model named attribute types, wherein facility instances and named attribute instances are stored in memory and coupled in a facility network to simulate transport phenomenon," as recited in claim 1. Further, claims 1-4 and 6-9 are also believed to be patentable because the other references do not cure the deficiencies of Stroustrup. Hence, the cited references, alone or in combination, do not disclose or suggest the claimed subject matter.

To begin, Stroustrup describes the C++ concept for creating developer-defined types beyond the built-in types provided by a programming language, e.g., integers, floating point numbers, booleans, character strings, etc. A class is the C++ construct for defining a developer-defined type. *See* Stroustrup pages 223-224, 732-734. Further, defining derived classes provides a means of organizing related classes that allow the programmer to take advantage of their relationships. *See id.* In particular, Stroustrup describes that inheritance may be utilized to represent the hierarchical relationships directly. *See id.* at page 734. Further, Stroustrup describes a vehicle class having car and truck subclasses, which also have additional subclasses, such as police car, ambulance, fire engine, and hook and ladder. *See id.* at pages 734-735. The class hierarchy with its relationships between the classes, as noted by Stroustrup, should be selected based on the most realistic model.

However, Stroustrup appears to be devoid of any discussion of a file that defines model facility types based on the first set of generic classes and model named attributes types based on the second set of generic classes. Further, nothing in Stroustrup suggests that the

definitions file permits the addition of additional model facility types and additional model named attribute types without any modifications to the class hierarchy. In fact, the modification of the emergency class and vehicle class, as described in Stroustrup, changes the class hierarchy. *See id.* at page 735. As such, Stroustrup fails to disclose the claimed subject matter of claim 1.

Furthermore, while Sarda is only used in combination with Stroustrup in the rejection of claims 6 and 7, Sarda does not cure the deficiencies of Stroustrup to disclose or teach the subject matter of claim 1. The Sarda reference describes modeling associated with a well test in a fractured reservoir. *See* Sarda, col. 2, lines 8-17. In particular, the method of Sarda models fluid flow in the fractured multilayer porous medium by accounting for the real geometry of the fracture network and the local exchanges with the porous matrix. *See id.* at col. 2, lines 55-61. Indeed, in Sarda, the medium is modeled as a grid of nodes that are used to model the fluid flow. *See id.* at col. 2, line 55, col. 3, line 30.

Applicants note that Sarda appears to be devoid of any discussion of a file that defines model facility types based on the first set of generic classes and model named attribute types based on the second set of generic classes. Further, nothing in Sarda suggests that the definitions file permits the addition of additional model facility types and additional model named attribute types without any modifications to the class hierarchy. Accordingly, as Sarda fails to disclose the claimed subject matter of claim 1, it fails to cure the deficiencies of Stroustrup.

Moreover, while Vlissides is only used in combination with Stroustrup in the rejection of claim 7, Vlissides also does not cure the deficiencies of Stroustrup to disclose or teach the subject matter of claim 1. The Vlissides reference describes a Factory Method that defers instantiation to subclasses. *See* Vlissides, p. 107. In Vlissides, frameworks use abstract classes to define and maintain relationships between objects. *See id.* As an example, a Factory Method pattern in an application to provide multiple documents encapsulates the knowledge of which Document subclass to create and moves this knowledge out of the framework. *See id.* To provide this function, code in Vlissides uses a Product interface to work with any user-defined ConcreteProduct classes, which are subclasses. *See id.* at p. 109.

Applicants note that Vlissides appears to be devoid of any discussion of modeling a physical system, much less, a file that defines model facility types based on the first set of generic classes and model named attribute types based on the second set of generic classes. Further, nothing in Vlissides suggests that the definitions file permits the addition of additional model facility types and additional model named attribute types without any modifications to the class hierarchy. In fact, Vlissides appears to modify its class hierarchy through the use of various subclasses. Thus, the Vlissides fails to disclose the claimed subject matter of claim 1. Accordingly, Vlissides fails to cure the deficiencies of Stroustrup.

Accordingly, Applicants respectfully submit that the Stroustrup reference does not anticipate claims 1-5, 8 and 9. Further, Applicants respectfully submit that the other cited references, alone or in combination with Stroustrup, do not render obvious the subject matter of claim 1 and the respective dependent claims. Therefore, Applicants respectfully request the Examiner withdraw the rejection and allow the pending claims 1-4 and 6-9.

Rejection of claims 10-12 under 35 U.S.C. § 103

The Examiner rejected claims 10-12 under 35 U.S.C. § 103 (a) as being unpatentable over Sarda in view of Stroustrup. Applicants respectfully assert that the Sarda and Stroustrup references do not disclose or teach the claimed subject matter.

In the rejection, the Examiner asserted that Sarda discloses all of the recited features except the software design of the method for modeling fluid flow. In an attempt to cure this deficiency, the Examiner relied on the Stroustrup reference to cure the deficiencies of the Sarda reference. Again, similar to the discussion of claim 1 above, Sarda does not provide or teach "building a model comprising a facility network, wherein the facility network comprises facility instances formed from model facility types based on a first set of generic classes and named attribute instances formed from model named attribute types based on a second set of generic classes, and wherein a data definitions file defines the model facility types and the model named attribute types and the first set and second set of generic classes are part of a class hierarchy that is not modified by the addition of other model facility types and other model named attribute types to the data definitions file," and "using the facility instances and named attribute instances in a mathematical simulation of transport phenomena within the

facility network as a function of time, wherein the facility instances and named attribute instances are organized to represent facilities used in the production of hydrocarbons from a reservoir," as recited in claim 10. As such, Sarda fails to disclose the claimed subject matter of claim 10.

As discussed above, the Sarda reference discloses modeling of a well test in a fractured reservoir. *See* Sarda, col. 2, lines 8-17. This modeling of fluid flows in the fractured multilayer porous medium by accounting for the real geometry of the fracture network and the local exchanges with the porous matrix does not provide or teach the claimed subject matter. In particular, Sarda does not provide a data definitions file that defines model facility types based on the first set of generic classes and model named attribute types based on the second set of generic classes, much less that the data definitions file permits the addition of additional model facility types and additional model named attribute types without any modifications to the class hierarchy. Accordingly, Sarda fails to disclose the claimed subject matter of claim 10.

Further, Stroustrup does not cure the deficiencies of Sarda. Again, Stroustrup describes the C++ concept for creating developer-defined types and to organize related classes in order to take advantage of the relationships. *See* Stroustrup, pages 223-224, 732-734. In particular, Stroustrup describes that inheritance may be utilized to represent the hierarchical relationships directly. *See id.* at page 734. While Stroustrup describes classes having subclasses, it does not describe or teach a data definitions file that defines model facility types based on the first set of generic classes and model named attribute types based on the second set of generic classes, much less that the data definitions file permits the addition of additional model facility types and additional model named attribute types without any modifications to the class hierarchy. As such, Stroustrup fails to disclose the claimed subject matter and fails to cure the deficiencies of Sarda.

Accordingly, in view of the remarks set forth above, Applicants respectfully submit that the Sarda and Stroustrup references, alone or in combination, do not render the claimed subject matter obviousness. Therefore, Applicants respectfully request that the Examiner withdraw the rejection and allow the pending claims 10-12.

Rejection of claim 13 under 35 U.S.C. § 103

The Examiner rejected claim 13 under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 6,434,435 to Tubel et al., which is herein referred to as "Tubel," in view of Sarda and Stroustrup. Applicants respectfully submit that the Tubel, Sarda and Stroustrup references do not disclose or teach the claimed subject matter.

In the rejection of independent claim 13, the Examiner relied upon the Tubel reference to disclose all of the recited features except discretizing the reservoir into a plurality of volumetric cells, each modeled as nodes, and simulating the exchange of fluid between those nodes along the software object hierarchy. In an attempt to cure these deficiencies, the Examiner relied upon the Sarda and Stroustrup references. However, Applicants respectfully note that Tubel, Sarda and Stroustrup fail to disclose each of the recited features of independent claim 13. For example, Tubel, Stroustrup and Sarda fail to disclose "using facility instances created from model facility types and named attribute instances created from model named attribute types to model the nodes and connections in the portion of the discretized model that represents wells and surface facilities of the physical system, wherein a data definitions file defines model facility types based on a first set of generic classes and model named attribute types based on a second set of generic classes with the first set of generic classes and the second set of generic classes arranged in a class hierarchy that permits the addition of additional model facility types and additional model named attribute types without any modifications to the class hierarchy," as recited in claim 13. Hence, the Tubel, Sarda and Stroustrup references cannot render the claimed subject matter obvious.

Tubel describes a process control optimization process for use with oilfield production management system. *See* Tubel; col. 1, lines 14-30 and col. 4, lines 5-10. In Tubel, the adaptive control process changes the model based on current process conditions through the use of intelligent software objects (ISOs). *See id.* at col. 6, lines 36-46. While each of the ISOs 10 have differing class hierarchy levels and data, they cooperate with other ISOs 10 of the same of different levels to achieve the systems goals. *See id.* at col. 9, lines 36-46. Further, the ISOs 10 may be connected into different groups of hierarchical sets. *See id.* at col. 13, lines 57-64. As such, Tubel describes the use of ISO that change the class hierarchy.

However, Tubel does not disclose or provide the claimed subject matter. In particular, Tubel does not appear to provide or suggest a data definitions file that defines model facility types based on the first set of generic classes and model named attribute types based on the second set of generic classes, much less that the data definitions file permits the addition of additional model facility types and additional model named attribute types without any modifications to the class hierarchy. As such, Tubel does not disclose the claimed subject matter.

Further, Stroustrup and Sarda fail to cure the deficiencies of Tubel. Again, Sarda merely describes modeling of a well test in a fractured reservoir. *See* Sarda, col. 2, lines 8-17. For at least the reasons discussed above, Sarda does not disclose the claimed subject matter. Similarly, Stroustrup describes the C++ concept for creating built-in types to organize classes and take advantage of the relationships. *See* Stroustrup page 223. Again, for at least the reasons cited above, Stroustrup also does not disclose the claimed subject matter. As such, Sarda and Stroustrup fail to cure the deficiencies of Tubel.

Accordingly, in view of the remarks set forth above, Applicants respectfully submit that the Tubel, Sarda and Stroustrup references do not rendered the claimed subject matter obvious. Therefore, Applicants respectfully request that the Examiner withdraw the rejection and allow the pending claim 13.

Rejection of Claims 16-28 under 35 U.S.C. § 102

The Examiner rejected claim 16-28 under 35 U.S.C. § 102 (e) as being unpatentable over Tubel. Applicants respectfully submit that Tubel does not disclose the claimed subject matter of the amended claims.

In the rejection of independent claims 16 and 24, the Examiner relied upon the Tubel reference to disclose all of the recited features. However, Applicants respectfully submit that Tubel fails to disclose each of the recited features of independent claims 16 and 24. For example, Tubel fails to disclose "providing model facility types created from the first set of generic classes," "providing model named attribute types that are associated with at least one of the model facility types and created from the second set of generic classes," and "providing

a data definitions file to define model facility types and model named attribute types, wherein the addition of the additional model facility types and the additional model named attribute types do not modify the class hierarchy of the first set of generic classes and the second set of generic classes," as recited in claim 16. Further, Tubel fails to disclose "define model facility types and model named attribute types in a file, wherein additional model facility types and additional model named attribute types do not modify the class hierarchy of the first set of generic classes and the second set of generic classes," and "create a hydrocarbon facility network with facility instances created from the model facility types and named attribute instances created from the model named attribute types," as recited in claim 24. Hence, the Tubel reference does not provide the claimed subject of claims 16 and 24.

To begin, as note above, Tubel describes a process control optimization process for use with oilfield production management system. *See* Tubel; col. 1, lines 14-30 and col. 4, lines 5-10. In Tubel, the adaptive control process changes the model based on current process conditions through the use of intelligent software objects (ISOs). *See id.* at col. 6, lines 36-46. However, Tubel does not appear to provide or suggest a definitions file that defines model facility types and model named attribute types, much less model facility types based on the first set of generic classes and model named attribute types based on the second set of generic classes. Further, Tubel does not appear to provide that the definitions file permits the addition of additional model facility types and additional model named attribute types without any modifications to the class hierarchy. As such, Tubel does not disclose the claimed subject matter of amended claims 16 and 24.

Accordingly, in view of the remarks set forth above, Applicants respectfully submit that the Tubel reference does not anticipate the claimed subject matter. Therefore, Applicants respectfully request that the Examiner withdraw the rejection and allow the pending claims 16-20 and 22-27.

Fees

In addition, Applicants hereby request a three month extension in the statutory period from October 27, 2006 to January 27, 2007 in accordance with 37 C.F.R. § 1.136. The Examiner is hereby authorized to charge the Deposit Account No. 05-1328 for the fee associated with this extension of time. Further, if any additional fees are required, the Commissioner is authorized to charge the appropriate fees to the deposit account noted above.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: January 26, 2007

Brent R. Knight, Reg. No. 54,226
ExxonMobil Upstream Research Company
P. O. Box 2189 (CORP-URC-SW 337)
Houston, TX 77252-2189
(713) 431-4563 Phone
(713) 431-4664 Fax

Certificate of Facsimile Transmission

I hereby certify that this correspondence is being transmitted via facsimile to Examiner Proctor, Technology Center 2100, United States Patent and Trademark Office at (571) 273-8300 on January 26, 2007.

Margaret Gnewuch